

# CHAPTER 3

## Resource Functions and Considerations

### INTRODUCTION

This chapter identifies Lake Istokpoga's primary water resource functions to be protected by the proposed minimum flow and level (MFL), as well as the baseline resource conditions for assessing *significant harm*. Considerations for making this determination are set forth in Section 373.0421(1)(a) F.S., which allows the water management districts to consider changes and structural alterations that have occurred to a water resource when setting a MFL. This chapter also contains a discussion of resource protection issues, policies and procedures established to protect these resources.

### WATER RESOURCE FUNCTIONS

Water resources within the Lake Istokpoga watershed serve a variety of functions that need to be considered in MFL development. These functions include water supply, flood control, water quality, wildlife habitat, navigation and recreation. The Lake Istokpoga watershed can be divided into different hydrological components, each associated with a different water body having unique characteristics (**Figure 10**). A discussion of these hydrological units is provided in the Surface Water Hydrology section of **Chapter 2**.

#### Water Supply and Flood Control

Surface water flows in the upper Lake Istokpoga watershed may be stored in Lake Arbuckle or Lake Josephine, or generally directed toward Lake Istokpoga through two major tributaries, Arbuckle Creek and Josephine Creek. Upstream water inflows to Lake Istokpoga may be stored or passed downstream for water supply or released to the Kissimmee River or Lake Okeechobee.

Lake Istokpoga water levels are regulated within a narrow range ( $\pm 2$  ft) to support two primary goals: flood protection and water supply. The annual regulation schedule requires lowering the lake during the summer to provide storage and flood protection during the rainy season. The regulation schedule also requires increasing lake levels during the winter when flooding potential is low and water supply needs are highest (**Figure 11**). This schedule is opposite the natural annual cycle in which lake levels rise to their highest in the summer and decline during drier winter months.

Water from Lake Istokpoga is released through two primary routes. The G-85 Structure discharges water from Lake Istokpoga into the Istokpoga Canal, which flows

eastward to the Kissimmee River. The S-68 is a gated water control structure at the south end of Lake Istokpoga that discharges into the C-41A Canal. Water releases from the S-68 are generally routed into the Kissimmee River and/or to Lake Okeechobee. An extensive network of drainage ditches to the south of Lake Istokpoga drains agricultural lands and provides a source of irrigation water during the dry season. The ability to quickly pass water through drainage canals is necessary for flood protection during the rainy season when frequent, localized heavy rains occur.

The Brighton Indian Reservation and Indian Prairie, in Glades County south of Lake Istokpoga, are supplied with water mostly from Lake Istokpoga. The Reservation's primary land use is agriculture and the Lake Istokpoga-Indian Prairie Basin has historically experienced water shortages. The Seminole Tribe of Florida, the State of Florida and the SFWMD executed a Water Rights Compact in 1987, which establishes the Tribe's water entitlement for the Brighton Reservation (see **Appendix A**). Although water supply releases from Lake Istokpoga may affect lake level decrease rates, the current regulation schedule does not allow water releases below 37.0 feet NGVD (see **Figure 11**) and, as such, these agreements are not expected to impact the proposed MFL.

## Water Quality

Water quality within the Lake Istokpoga watershed can vary considerably by site. Isolated wetlands may contain water of relatively high quality; however, water bodies associated with or downstream of agricultural lands can have significant water quality problems. The proliferation of weedy species, which can impact fish and wildlife habitats, is supported by elevated nutrient inputs from upstream sources and unnatural hydropatterns.

The primary sources of water to Lake Istokpoga are rainfall and tributary inflows. Tributary inflows, especially from Arbuckle Creek, are typically of lower quality (O'Dell *et al.* 1995). The results of a pollution risk analysis indicate that many areas surrounding Arbuckle Creek, Lake Istokpoga and southward toward Indian Prairie have a moderate risk for nutrient pollution (nitrogen and phosphorus) (**Figure 22**). Results from monitoring efforts in Lake Istokpoga indicate that water quality has been impacted by land uses surrounding the lake, as well by lake level regulation and aquatic plant management activities (**Tables 7, 8 and 9**).

## Recreation and Navigation

Lake and river recreation are important activities in the Lake Istokpoga watershed. The many wetlands and surface waters in the watershed provide extensive opportunities for recreational boating, canoeing, camping, fishing, wildlife observation, hunting, waterskiing and swimming. Many of these uses depend on adequate water levels, flow and water quality to support healthy plant and animal communities. Recreation on the many lakes, wetlands and creeks within the watershed provides a significant economic base for the region.

## Fish and Wildlife Habitat

The Lake Istokpoga watershed contains some relatively undeveloped creeks and lakes. The watershed also borders the Kissimmee River Basin, which is currently undergoing a comprehensive restoration effort. The remaining water bodies and wetlands provide important wildlife habitat for a large array of birds, including osprey, bald eagles, sandhill cranes, wading birds, ducks, migratory birds and other species of concern (FWC 2000, Stewart 2001). Aquatic habitats support a significant fishery, both in terms of importance to wildlife and for recreational fishing. Maintenance of sufficient water depths and hydroperiods within these water bodies is required to protect existing plant and animal communities. The larger lakes in the watershed provide important habitat for freshwater fish that are important to recreational fishing interests, wading birds and raptors, including largemouth bass, bluegill, crappie and catfish. Aquatic beds within lakes provide important habitat for freshwater organisms, many of which are a food source for fish and other wildlife. Swamps along the lake margins contain a number of species of trees and shrubs that provide important specialized wildlife habitats.

The Division of Fisheries Management of the FWC lists Lake Istokpoga as one of Florida's top ten lakes for catching largemouth bass, black crappie and bluegill. Overall, the FWC estimates Lake Istokpoga's sport fishery to be valued at \$6 million annually (FWC 2002). Lake Istokpoga is also known for its significant bird population, which includes a number of federally threatened and endangered species. The wading bird rookery on Bumblebee Island in Lake Istokpoga is one of the most important rookeries in the area and studies of osprey along the lake have documented one of the largest concentrations of active nests ever found (Stewart 2001).

## ALTERATIONS

### Hydrological Changes

During the past century, changes made to provide drainage, water supply and flood protection for homes and farms, and to improve lake access have irreversibly altered the structure and biological resources of Lake Istokpoga. These changes include:

- Alterations of natural hydrological patterns and variability, which have allowed increased residential development along the lake, encouraged the expansion of undesirable weedy plant species into habitats important to fish and wildlife and promoted the proliferation of floating vegetation mats that interfere with navigation and can clog water control structures.
- Reduction of water tables, which has reduced the extent of wetlands, stressed remaining wetlands and encouraged development into areas that were previously flooded.

- Drainage of wetlands within the historic Lake Istokpoga floodplain for development.
- Diversion of natural water flows.
- Alteration of natural water courses and shorelines.
- Construction of drainage ditches and canals.
- Changes to seasonal flooding patterns to provide maximum water levels during the dry season and minimum water levels during the wet season.

## Water Quality and Biological Changes

Water quality changes in the Lake Istokpoga subbasin that have occurred in the past 50 years are mostly associated with the expansion of agriculture in the region. The effects of fertilizer and pesticide runoff from agricultural crop lands in this region are enhanced by the general sterility and high leaching capacity of the sandy soils, and relatively high annual rainfall amounts across the region (**Table 1**). Runoff from feed lots and other intensive cattle-raising operations are a significant source of nutrients and pathogenic organisms (see Zahina *et al.* 2001b). Lake Istokpoga was historically a sandy-bottom lake (FWC 2000), but today many areas have extensive organic substrate deposits. Stabilization of natural water level fluctuations has stimulated production of vegetation communities and deposition of nutrient-rich organic sediments and has inhibited the natural cycle of degradation, compaction and oxidation that once occurred.

Eutrophication of Lake Istokpoga has supported the expansion of weedy species that were once much less common along the lake shore. This includes cattail and pickerel weed, which have replaced much of the littoral marsh community and filled in shallow open-water areas. In addition, the introduction and expansion of hydrilla within aquatic habitats have displaced native communities of desirable vegetation (FWC 2000).

## CONSIDERATIONS AND EXCLUSIONS

Once the functions and features of the water resource requiring protection by a specific minimum flow or level are identified, the baseline resource conditions for assessing *significant harm* must be determined. The basis for making this determination is set forth in Section 373.0421(1)(a), F.S., which requires the water management districts to consider changes and structural alterations that have occurred to a water resource when setting a MFL. Section 373.0421(1)(b), F.S. provides exclusions from the MFL requirement by recognizing that certain water bodies no longer serve their historical function and that recovery of these water bodies to historical conditions may not be feasible.

## Considerations

Lake Istokpoga has a variety of features and functions that affect, or are affected by, the need to establish MFLs as follows:

- Natural systems, including aquatic vegetation communities, wetlands, fish and wildlife.
- Hydrology.
- Water supply.
- Flood protection.
- Water quality.
- Navigation and recreation.

### Natural Systems

Natural systems in Lake Istokpoga have been significantly altered due to human activities during the past century. Some areas of the lake remain in fairly good condition, although many are artificially maintained by vegetation control projects. Maintenance of aquatic communities, littoral zone marsh and lake swamp is important to provide habitat for wildlife use, recreation and support for the local economic base, as well as for aesthetic values. Significant areas in the watershed have been permanently changed from natural landscapes to urban and agricultural land uses.

### Hydrology

Hydrological changes, which have occurred in the Lake Istokpoga area due to drainage, water supply and flood control activities, have significantly altered the frequency, timing and duration of natural water level variations. This includes a stabilization of water level fluctuation, elimination of extreme events and alteration of the timing of high/low water periods. These changes have led to alteration of biological communities within the lake and have negatively affected natural physical processes that improved water quality.

### Water Supply

Management of the lake as a water supply source is one factor incorporated into the current operational schedule. Water supply releases from the S-68 are not allowed when water levels fall below a minimum lake level (**Figure 11**). Section 373.042(a), F.S. prohibits *significant harm* from occurring due to existing or future water supply withdrawals. Once the MFL is established, the need to meet existing and future reasonable-beneficial water supply requirements must be factored into a recovery and prevention strategy, as explained in Section 373.0421(b), F.S.

## Flood Protection

Water levels in Lake Istokpoga are managed to reduce the potential for flooding of surrounding private lands and residences. The construction of a numerous drainage canals in the areas upstream and downstream of Lake Istokpoga has significantly altered the natural drainage patterns of the area. Management of this canal system and associated water control structures has altered the flooding pattern of the area. Any proposed MFL will meet or exceed existing levels of flood control.

The need to protect developed lands adjacent to the lake from flooding is a constraint preventing the lake from achieving historic high water levels. Some areas of former wetland forests adjacent to the lake can never be effectively reflooded and represent a permanent change from wetland to upland resources.

## Water Quality

Water quality is most directly affected by continuous inputs of pollutants from upstream runoff sources and efforts are underway to reduce these inputs over time. The relationship between water levels and water quality is less direct, associated with deposition of organic sediments, proliferation of tussocks and management of aquatic weeds. These indirect effects will be considered during development of MFL criteria.

## Navigation and Recreation

Navigation and recreation on Lake Istokpoga are impacted by low water levels, which restrict boat access to the lake. Any proposed MFL will consider the need for lake access and the impact of low water levels on lake recreational activities.

## Exclusions

As described in **Chapter 1**, Section 373.0421(1)(b), F.S. recognizes that in certain cases a water body may no longer serve its historical function and recovery of this water body to its historical condition may not be practical or feasible. District staff determined that it was not appropriate to apply this exclusion to Lake Istokpoga relative to MFL establishment. The remaining exclusions in Subsections 373.0421(1)(b) 2 through 3, F.S. pertain to water bodies less than 25 acres in size or to constructed water bodies, and as such, do not apply to Lake Istokpoga.

Lake Istokpoga and its associated habitats are greatly altered by development in the basin, flood protection and water supply needs, to the extent that full recovery of historic water level characteristics of the lake and associated tributaries and wetlands, may not be technically or economically feasible. However, the need to protect and enhance the remaining natural features in the system is clearly identified. The consideration in Section 373.0421(1)(a), F.S., seems to adequately address the changes and alterations in water resource functions applicable to these areas. As a result, there is no apparent basis to invoke the exclusion in Subsection 373.0421(1)(b)1 F.S.

In summary, the SFWMD will establish a MFL for Lake Istokpoga based on consideration of structural alterations to the resource, as allowed pursuant to Section 373.042(1)(a), F.S. Section 373.042(a), F.S. prohibits allowing *significant harm* to be caused by existing or future water supply withdrawals. Once the MFL is established, the need to meet existing and future reasonable-beneficial water supply requirements must be factored into the recovery and prevention strategy.

